



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/797,272

03/10/2004

Brian S. Higgins

7340-010

2948

4678 7590 01/03/2012  
MACCORD MASON PLLC  
300 N. GREENE STREET, SUITE 1600  
P. O. BOX 2974  
GREENSBORO, NC 27402

EXAMINER

TRIEU, TIMOTHY K

ART UNIT

PAPER NUMBER

3743

MAIL DATE

DELIVERY MODE

01/03/2012

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/797,272	<b>Applicant(s)</b> HIGGINS, BRIAN S.	
	<b>Examiner</b> TIMOTHY K. TRIEU	<b>Art Unit</b> 3743	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 02 March 2011.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 5) ☒ Claim(s) 1-24 is/are pending in the application.
- 5a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 6) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 7) ☒ Claim(s) 1-24 is/are rejected.
- 8) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 9) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 12) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____.                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date ____.  | 6) <input type="checkbox"/> Other: ____.                          |

## DETAILED ACTION

### ***Response to Arguments***

Applicant's arguments filed 03/02/2011 have been fully considered but they are not persuasive. The Applicant's submitted the Declaration Under 37 CFR 1.132 of Mark Shilling. At which, Mr. Shilling is an employee of the assignee and therefore, he is an interested party. In addition, the declaration lacked factual statements concerning specific values for the various parameters in the claims. Moreover, on 09/02/2010 the Examiner rejected claims 1-24 Under 35 U.S.C 112, first paragraph, as failing to comply with the written description requirement and failing to comply with the enablement requirement;

In regarding 35 U.S.C. 112, first paragraph, enablement; Applicants has submitted a declaration under 37 CFR 1.132 of Mark Shilling (hereinafter "Shilling Declaration") and argued that *"Mr. Shilling's testimony is evidence of what a Person Of Ordinary Skill In The Art would have known at the time of filling, which is based on his personal experience, and not test data. Further, the declaration is replete with testified facts, examples and references to the specification."*

The Examiner disagrees with the Applicants. After having carefully reviewed the Shilling Declaration, the Examiner respectfully submits that the Shilling Declaration fails to provide technical facts and/or data from experimentation. The Shilling Declaration does not provide enough evidence to satisfy the enablement requirement. In this case the claims are very broad. In addition, the inventor has not provided sufficient direction as the statements in the Declaration are only of a general nature. The applicant has not

Art Unit: 3743

provided any evidence of a working example. Indeed, the Declaration merely states that Shilling would have known how to achieve optimum NO<sub>x</sub> levels with the potential methods. There are no known working examples provided and no parameters are given in the Declaration. Only an end result is mentioned. At most, in sections C-D, the Shilling Declaration, discusses **potential methods** for increasing the temperature, decreasing the density of air which results in a reducing atmosphere; decreasing the stoichiometric ratio which will reduce the generation of SO<sub>3</sub> through enhancing the reducing atmosphere in the burner zone; and decreasing the local air flow which will alter the fuel/air ratio resulting in more of a reducing atmosphere, etc.,. The Declaration in section 13 merely discusses potential methods in very general terms without providing specifics. The Shilling Declaration fails to provide technical facts and/or data from experiments and the specification does not provide sufficient written description for claim limitations. As a result, the claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Furthermore, the Shilling declaration has not discussed how the invention would be unobvious to one of ordinary skill. In fact it supports the 35 USC 103 rejection given below and in previous actions as it is in essence an admission against interest that the invention would be obvious to one of ordinary skill in the art. Since, the Applicant has still failed to provide specific data to overcome the rejection Under 35 U.S.C 112, first paragraph, the rejection is maintained.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

1. Claims 1-24 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The claims refer to “actively adjusting the reducing environment using at least two adjustments chosen from increasing the distance between the first stage and the second stage, increasing mixing within the first stage by macro-staging, reducing the mass flow, increasing the volumetric utilization, increasing the pressure, increasing the density,, increasing the temperature, decreasing the stoichiometric ratio, increasing the local fuel flow, decreasing the local air flow, and decreasing micro-stage mixing, wherein by the adjusting SO<sub>3</sub> is reduced to SO<sub>2</sub> to effectuate an overall decrease in SO<sub>3</sub> concentration to less than about 15 ppm; actively adjusting the reducing environment using at least two adjustments chosen from increasing the distance between the first stage and the second stage, increasing mixing within the first stage by macro-staging, reducing the mass flow, increasing the

Art Unit: 3743

volumetric utilization, increasing the pressure, increasing the density,, increasing the temperature, decreasing the stoichiometric ratio, increasing the local fuel flow, decreasing the local air flow, and decreasing micro-stage mixing, wherein by the adjusting S03 is reduced to S02 to effectuate an overall decrease in SO3 concentration; actively adjusting the reducing environment using at least two adjustments chosen from increasing the distance between the first stage and the second stage, increasing mixing within the first stage by macro-staging, reducing the mass flow, increasing the volumetric utilization, increasing the pressure, increasing the density,, increasing the temperature, decreasing the stoichiometric ratio, increasing the local fuel flow, decreasing the local air flow, and decreasing micro-stage mixing, wherein by the adjusting S03 is reduced to S02 which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

2. Claims 1-24 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Claim 1 refers to actively adjusting the reducing environment using at least two adjustments chosen from increasing the distance between the first stage and the second stage, increasing mixing within the first stage by macro-staging, reducing the mass flow, increasing the volumetric utilization, increasing the pressure, increasing the density,, increasing the temperature, decreasing the stoichiometric ratio, increasing the

Art Unit: 3743

local fuel flow, decreasing the local air flow, and decreasing micro-stage mixing, wherein by the adjusting S03 is reduced to S02 to effectuate an overall decrease in SO3 concentration to less than about 15 ppm; ” which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Claim 9 refers to “actively adjusting the reducing environment using at least two adjustments chosen from increasing the distance between the first stage and the second stage, increasing mixing within the first stage by macro-staging, reducing the mass flow, increasing the volumetric utilization, increasing the pressure, increasing the density,, increasing the temperature, decreasing the stoichiometric ratio, increasing the local fuel flow, decreasing the local air flow, and decreasing micro-stage mixing, wherein by the adjusting” which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Claim 17 refers to “actively adjusting the reducing environment using at least two adjustments chosen from increasing the distance between the first stage and the second stage, increasing mixing within the first stage by macro-staging, reducing the mass flow, increasing the volumetric utilization, increasing the pressure, increasing the density,, increasing the temperature, decreasing the stoichiometric ratio, increasing the local fuel flow, decreasing the local air flow, and decreasing micro-stage mixing, wherein by the adjusting S03 is reduced to S02” which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 4,375,949 to Salooja ("Salooja") in view of U.S. Patent No. 4,029,752 to Cahn ("Cahn"), and applicant's admitted prior art, and further in view of U.S. Patent No. 4,196,057 to May ("May") (previously cited) and Altman (5,011,516).

Salooja discloses in the specification and figures 1-10 an invention in the same field of endeavor as applicant's invention and similar to that described in applicant's claims 1-24.

In particular, in regard to at least claim 1, Salooja discloses a method of reducing the acidity (each of nitrogen oxides and sulfur trioxides, see cols. 5-7) comprising the steps of:

c) partially combusting the fuel in a first stage to create a reducing environment (see at least col. 1, lines 50-54);



Art Unit: 3743

d) actively adjusting the reducing environment such that  $\text{SO}_3$  is reduced to  $\text{SO}_2$  to effectuate an overall decrease in  $\text{SO}_3$  concentration to achieve a desirable level of  $\text{SO}_3$  (see at least col. 1, lines 54-59 and col. 7 lines 5- 20 describing that the nitrogen oxides and sulfur tri-oxides are controlled to desired/predetermined levels); Also see the rejections of claims 4-8 and 10-15, 18-23 below.

e) combusting the remainder of the fuel and combustion intermediates in a second stage with oxidizing environment to achieve 10 to 15 ppm by volume  $\text{SO}_3$  in the exhaust; thereby controlling levels of  $\text{SO}_3$  in the flue gases (see at least col. 1, lines 60-63 and lines 29-33), (col.7, lines 5-21). Note: (As evidence by Johnson (6143263), col.6, lines 6-11 achieving low concentration of  $\text{SO}_3$  old or well known in the art).

Cahn teaches a method of reducing sulfur oxides that is considered to be in the same field of endeavor as both applicant's invention and Salooja. Cahn describes that sulfur oxides in a process gas stream are reduced by reaction with ammonia (i.e.  $\text{NH}_3$ ) as a reducing agent (see at least col. 7, lines 48-52). Cahn clearly provides that sulfur trioxide is reduced in the same manner as the described processes for sulfur dioxide (see at least col. 7, lines 34-38). The examiner notes that at least ammonia ( $\text{NH}_3$ ) is considered to be the type of reducing radical described in applicant's specification (see specification p. 9, line 14 lists  $\text{NH}_i$ ). Further, the examiner also notes that Cahn also suggests that other reducing agents such as  $\text{H}_2$ ,  $\text{CO}$ , and  $\text{CH}_4$  (also listed in applicant's specification) are recognized in the art as reducing radicals creating a reducing environment (see Cahn, col. 7, lines 65-68). This describes process of employing either ammonia or other above noted agent to result in the reduction of sulfur trioxide (a

Art Unit: 3743

reducible acid) is considered to suggest the reduction by electron addition described in applicant's specification and claimed in claim 17.

Returning to Salooja, while this reference provides only some detail of the reducing of sulfur trioxides through the practice of the described method, there is clear suggestion that the reduction of sulfur trioxides is recognized in the art. Accordingly, a person of ordinary skill in the art at the time the invention was made would desirably modify the process in Salooja to incorporate the reduction by electron addition suggested by Cahn to desirably produce a gas stream that has "little or no" sulfur trioxide (see at least Cahn, col. 8, lines 41-46).

Regarding the limitations of utilizing SCR system, applicant discloses in the specification that "an SCR is often only intended to be used for six months per year", and "are bypassed during the winter". This is regarded as an admission of prior art. Salooja, Cahn, and applicant's admitted prior art teach substantially all of the limitations of the methods recited in claims 1-24 with exception of the steps of actively adjusting the reducing environment (claims 1 and 9 and 17). These additional steps have not been identified in Salooja, Cahn, and applicant's admitted prior art.

However, In regard to claims 1 and 9 and 17, the acid of concentration of the flue gas is directly related to the acid dew point temperature of the flue gas. This is expressly noted by applicant in applicant's description of the prior art, namely "...as the SO<sub>3</sub> concentration increases, the acid dew point temperature of the flue gas increases." (see applicant's specification, p. 1, lines 16-18). To further support this assertion the examiner also points to May. May discloses a method which provides that

Art Unit: 3743

"measurement of dew point enables a semi-quantitative determination of the sulfur trioxide concentration in the exhaust or flue gas" (see May, col. 5, lines 30-32 and 38-42). Accordingly, a person of ordinary skill in the art would understand that reduction of the acid concentration of the flue gas necessarily results in the lowering of the acid dew point level of the flue gas. As noted above, Salooja provides for the reduction of sulfur oxides from the effluent of flue gas of a furnace to a desired level (see at least col. 1, lines 54-59 and cols. 5-7). Therefore, a person of ordinary skill in the art would reasonably understand that obtaining the reduction target of the oxides in the flue gas as specified in Salooja would necessarily result in a corresponding desired dew point level and would be due to an active adjustment (again see at least May, col. 5, lines 38-42). Regarding the claim language of providing a combustion system having a first stage and a second stage a mass flow, a volumetric utilization, a pressure, a density, a given temperature, a stoichiometric ratio, a local fuel flow, a local air flow, and optionally a micro-stage such parameters are inherently found in the furnace systems of the prior art and AAPA.

In regard to at least claim 2 and 3, Salooja describes that a catalytic burner is supplied at least in the first stage that produces lower NO<sub>x</sub> production than conventional combustion systems (see at least col. 2, lines 7-12, col. 6, line 67 through col. 7, line 4 and col. 4, lines 31-47) and thus reasonably suggests micro-staging through the use of low-NO<sub>x</sub> burners.

In further regard to claims 2 and 3, as noted above, while the examiner considers that the operation of the catalytic burners suggests the recited micro-staging using low NO<sub>x</sub>

Art Unit: 3743

burners, even if this is not a proper understanding, the examiner notes that applicant admits that the use of micro-staging using low-NOx burners to reduce emissions in combustion furnaces is known in the art (see admitted prior art of page 5, lines 4-18 of applications' specification). Accordingly, even if the operation of the catalytic burners of Salooja are not properly considered to be applicant's recited micro- staging using low NOx burners, a person of ordinary skill in the art would desirably seek to incorporate micro-staging using low NOx burners in the process of Salooja in order to desirably aid in reducing NOx emissions (see admitted prior art of p. 5, lines 4-18 of applications' specification).

4. In regard to at least claims 4-8 and 10-15, 18-23, applicant also admits that the use of macro-staging using over-fired air and used in combination with micro-staging using low NOx burners is known in the art (see admitted prior art of page 5, line 19 through page 6, line 5 of applications' specification). Accordingly, a person of ordinary skill in the art would seek to employ macro-staging using over-fired air in a combustion stage and/or in combination of micro-staging using low NOx burners to desirably achieve NOx emissions reduction (see admitted prior art of page 5, line 19 through page 6, line 5 of applications' specification). Regarding claims 8, 16 and 24 Salooja teaches burning a "carbonaceous fuel", which is considered to suggest coal.

5. Claims 9-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kindig (4824441) in view of Carver (4381718) and applicant's admitted prior art. Kindig discloses a) partially combusting the fuel in a first stage to create a reducing

Art Unit: 3743

environment (col. 10, lines 51-54), b) adjusting the reducing environment such that SO<sub>3</sub> is reduced to SO<sub>2</sub> to achieve a desirable level of SO<sub>3</sub> ...; (col. 13, lines 8-23, SO<sub>3</sub> and SO<sub>2</sub> are inherently produced during combustion, and reduction is inherently occurring.), c) combusting the remainder of the fuel and combustion intermediates in a second stage with oxidizing environment, combusting the remainder of the fuel in an oxidizing environment (col. 10, lines 43-47), thereby controlling the levels of SO<sub>3</sub> in the flue gases, reducing the conversion of levels of SO<sub>3</sub> in the flue gases, thereby controlling the levels of SO<sub>3</sub> in the flue gases (col. 13, lines 20-22), micro-staging the first stage fuel combustion, the micro-staging is provided through the use of low-Nox burners (col. 12, line 43), macro-staging the first stage of fuel combustion, the macro-staging is provided through the use of over-fired air (col. 10, lines 46), including a combination of micro-staging and macro-staging (col. 12, line 43, col. 10, line 46), the micro-staging is provided by low-Nox burners and the macro-staging is provided by over-fired air (col. 12, line 43, col. 10, line 46), the fuel is coal (col. 1, line 16). Carver et al teaches actively adjusting, effectuate an overall decrease in SO<sub>3</sub> concentration (abstract, figs.) for the purpose of meeting environmental regulations. It would have been obvious to one of ordinary skill in the art to modify Kindig by including actively adjusting, effectuate an overall decrease in SO<sub>3</sub> concentration as taught by Carver for the purpose of meeting environmental regulations. The applicant is combining prior art elements according to known methods to yield predictable results. Regarding the claim language of providing a combustion system having a first stage and a second stage a mass flow, a volumetric utilization, a pressure, a density, a given temperature, a stoichiometric ratio, a local

Art Unit: 3743

fuel flow, a local air flow, and optionally a micro-stage such parameters are inherently found in the furnace systems of the prior art and AAPA. Moreover these claim limitation are found in the preamble which is generally given little patentable weight.

6. In further regard to claims 10 and 11, as noted above, while the examiner considers that the operation of the catalytic burners suggests the recited micro-staging using low NOX burners, even if this is not a proper understanding, the examiner notes that applicant admits that the use of micro-staging using low-NOx burners to reduce emissions in combustion furnaces is known in the art (see admitted prior art of page 5, lines 4-18 of applications' specification). Accordingly, even if the operation of the catalytic burners of Salooja are not properly considered to be applicant's recited micro-staging using low NOx burners, a person of ordinary skill in the art would desirably seek to incorporate micro-staging using low NOx burners in the process of Salooja in order to desirably aid in reducing NOx emissions (see admitted prior art of p. 5, lines 4-18 of applications' specification) and to adjust.

7. In regard to at least claims 12-15, applicant also admits that the use of macro-staging using over-fired air and used in combination with micro-staging using low NOx burners is known in the art (see admitted prior art of page 5, line 19 through page 6, line 5 of applications' specification). Accordingly, a person of ordinary skill in the art would seek to employ macro-staging using over-fired air in a combustion stage and/or in combination of micro-staging using low NOx burners to desirably achieve NOx

Art Unit: 3743

emissions reduction (see admitted prior art of page 5, line 19 through page 6, line 5 of applications' specification) and to adjust.

8. Claims 1-3, 4-8, 9-15, 16, 17-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carver et al (4381718) in view of applicant's admitted prior art. Carver discloses partially combusting the fuel in a first stage to create a reducing environment (1, fig. 1), b) actively adjusting the reducing environment such that SO<sub>3</sub> is reduced to SO<sub>2</sub> to effectuate an overall decrease in SO<sub>3</sub> concentration prior to ... to achieve a desirable level of SO<sub>3</sub>; (2 to 3, SO<sub>3</sub> and SO<sub>2</sub> are inherently produced during combustion, and reduction is inherently occurring, residence time adjusted prior to lean stage, Abstract, figs., also see the rejections of claims 2, 3, 10, 11, 18 and 19 below and claims 4-7, 12-15, 20-23 below), c) combusting the remainder of the fuel and combustion intermediates in a second stage with oxidizing environment, combusting the remainder of the fuel in an oxidizing environment, thereby controlling the levels of SO<sub>3</sub> in the flue gases, reducing the conversion of levels of SO<sub>3</sub> in the flue gases, thereby controlling the levels of SO<sub>3</sub> in the flue gases (4, fig. 1), micro-staging the first stage fuel combustion, the micro-staging is provided through the use of low-Nox burners (col. 5, line 23), the fuel is coal (fig. 1). Regarding the claim language of providing a combustion system having a first stage and a second stage a mass flow, a volumetric utilization, a pressure, a density, a given temperature, a stoichiometric ratio, a local fuel flow, a local air flow, and optionally a micro-stage such parameters are inherently found in the furnace systems of the prior art and AAPA.

9. In further regard to claims 2, 3, 10, 11, 18 and 19 as noted above, while the examiner considers that the operation of the catalytic burners suggests the recited micro-staging using low NOX burners, even if this is not a proper understanding, the examiner notes that applicant admits that the use of micro-staging using low-NOx burners to reduce emissions in combustion furnaces is known in the art (see admitted prior art of page 5, lines 4-18 of applications' specification). Accordingly, even if the operation of the catalytic burners of Salooja are not properly considered to be applicant's recited micro-staging using low NOx burners, a person of ordinary skill in the art would desirably seek to incorporate micro-staging using low NOx burners in the process of Salooja in order to desirably aid in reducing NOx emissions (see admitted prior art of p. 5, lines 4-18 of applications' specification) and to adjust.

10. In regard to at least claims 4-7, 12-15, 20-23 applicant also admits that the use of macro-staging using over-fired air and used in combination with micro-staging using low NOx burners is known in the art (see admitted prior art of page 5, line 19 through page 6, line 5 of applications' specification). Accordingly, a person of ordinary skill in the art would seek to employ macro-staging using over-fired air in a combustion stage and/or in combination of micro-staging using low NOx burners to desirably achieve NOx emissions reduction (see admitted prior art of page 5, line 19 through page 6, line 5 of applications' specification) and to adjust.



Art Unit: 3743

11. Claims 4-7, 12-15, 20-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carver et al (4381718) in view of applicant's admitted prior art as applied to claim 1,9,17 above, respectively, and further in view of Kindig (4824441). Carver et al (4381718) in view of AAPA discloses applicant's invention substantially as claimed with the exception of macro-staging the first stage of fuel combustion, the macro-staging is provided through the use of over-fired air, including a combination of micro-staging and macro-staging, the micro-staging is provided by low-Nox burners and the macro-staging is provided by over-fired air. Kindig teaches macro-staging the first stage of fuel combustion, the macro-staging is provided through the use of over-fired air (col. 10, lines 46), including a combination of micro-staging and macro-staging (col. 12, line 43, col. 10, line 46), the micro-staging is provided by low-Nox burners and the macro-staging is provided by over-fired air (col. 12, line 43, col. 10, line 46) for the purpose of reducing emissions. It would have been obvious to one of ordinary skill in the art to modify Carver by including macro-staging the first stage of fuel combustion, the macro-staging is provided through the use of over-fired air, including a combination of micro-staging and macro-staging, the micro-staging is provided by low-Nox burners and the macro-staging is provided by over-fired air as taught by Kindig for the purpose of reducing emissions so that environmental regulations are met.

12. In further regard to claims 2, 3,10 11, 18 and 19 as noted above, while the examiner considers that the operation of the catalytic burners suggests the recited micro-staging using low NOX burners, even if this is not a proper understanding, the examiner notes that applicant admits that the use of micro-staging using low-NOx

Art Unit: 3743

burners to reduce emissions in combustion furnaces is known in the art (see admitted prior art of page 5, lines 4-18 of applications' specification). Accordingly, even if the operation of the catalytic burners of Salooja are not properly considered to be applicant's recited micro- staging using low NOx burners, a person of ordinary skill in the art would desirably seek to incorporate micro-staging using low NOx burners in the process of Salooja in order to desirably aid in reducing NOx emissions (see admitted prior art of p. 5, lines 4-18 of applications' specification) and to adjust.

13. In regard to at least claims 4-7, 12-15, 20-23 applicant also admits that the use of macro-staging using over-fired air and used in combination with micro-staging using low NOx burners is known in the art (see admitted prior art of page 5, line 19 through page 6, line 5 of applications' specification). Accordingly, a person of ordinary skill in the art would seek to employ macro-staging using over-fired air in a combustion stage and/or in combination of micro-staging using low NOx burners to desirably achieve NOx emissions reduction (see admitted prior art of page 5, line 19 through page 6, line 5 of applications' specification) and to adjust.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TIMOTHY K. TRIEU whose telephone number is (571)270-3495. The examiner can normally be reached on 8-5.

Art Unit: 3743

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Rinehart can be reached on 571-272-4881. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/TIMOTHY K TRIEU/  
Examiner, Art Unit 3743

/Kenneth B Rinehart/  
Supervisory Patent Examiner, Art Unit 3743